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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-3873

EXAMINER	
DHINGRA, RAKESH KUMAR	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 06/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/663,646	OHMOTO ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12,13 and 15-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12,13,15-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 12-17 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended claims 12, 15-17 and added new dependent claims 18, 19.

New reference has been found (US Patent No. 6,188,564, Hao) that when combined with Ogahara (US Patent No. 5,958,265), Sill et al (US Patent No. 6,367,413) and Shamouillian et al (US Patent No. 6,557,248) reads on limitations of claims 12, 16.

Accordingly claims 12, 16 and dependent claims 13, 15, 16, 18 and 19 have been rejected under 35 USC 103 (a) as explained below. Further, remaining dependent claim 17 has also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not

commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 12, 13, 15, 16, 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogahara (US Patent No. 5,958,265) in view of Sill et al (US Patent No. 6,367,413), Shamouillian et al (US Patent No. 6,557,248) and Hao (US Patent No. 6,188,564).

Regarding Claim 12: Ogahara teaches a plasma processing apparatus (Figure 1) for processing a product using a plasma comprising:

a power source 6 source for applying bias power to an (holder main body) electrode 1 on which a substrate 10 to be processed is disposed;

a holding plate (insulating layer) 2 formed on a surface of said electrode on which said substrate to be processed is disposed;

a chucking electrode (first conductive material) 61 formed within said insulating layer;

a conductor (first feeder line) 62 connecting said power source and said first conductive

a characteristic correction ring (silicon ring) 9 mounted at a position surrounding the substrate to be processed, on the surface of said electrode on which the substrate to be processed is disposed,

a ring chucking electrode (second conductive material) 91 formed within said insulating layer 2 and under said silicon ring 9;

a conductor (second feeder line) 92 connecting said power source 6 and said second conductive material (Column 1, line 30 to Column 2, line 45 and Column 4, lines 40-50 and Column 5, lines 5-40 and Column 7, line 10 to Column 8, line 10) .

Ogahara does not teach first and second variable capacitors, ring-like form of first conductive material, and thickness of insulating layer is greater in the peripheral portion (where first and second conductive materials are formed) of the electrode than the thickness in the central part of the electrode.

Sill et al teach a plasma apparatus (Figures 1, 2) that includes substrate support 20 with plurality of electrodes 44, 46 that are coupled to RF power source 48 through variable capacitors 56, 58 respectively (Column 6, line 50 to Column 8, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use variable capacitors for coupling the RF power source to the plurality of electrodes in substrate support as taught by Sill et al in the apparatus of Ogahara to vary the dc bias created on the substrate surface (Column 8, lines 5-30).

Ogahara in view of Sill et al do not teach ring-like form of first conductive material, and that thickness of insulating layer is greater in the peripheral portion (where first and second conductive materials are formed) of the electrode than the thickness in the central part of the electrode.

Shamouillian et al teach an apparatus (electrostatic chuck) [Figures 1c, 3)] that includes a chuck 20 having first and second electrodes 130, 135 within insulating layer 35b and also having electrical isolation voids 52. Shamouillian et al further teach (Figure 3)

chuck with double ring electrodes 130, 135 that also includes insulation void 52 to form a cooling groove 105 (Column 8, lines 1-30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use first conductive material having ring-like form as taught by Shamouillian et al in the apparatus of Ogahara in view of Sill et al to enable maximize electrode area and that electrodes can generate equivalent electrostatic clamping force (Column 8, lines 5-30).

Ogahara in view of Sills et al and Shamouillian et al do not teach thickness of insulating layer is greater in the peripheral portion (where first and second conductive materials are formed) of the electrode than the thickness in the central part of the electrode.

Hao teach an apparatus (Figures 3, 5A, 5B) that includes an electrostatic chuck 316 for supporting a wafer 302 and which further includes a dielectric layer 318 formed over a metal (conductive material) 320. Hao et al further teach (Figures 5A-5C) that by varying the geometry (thickness) of dielectric layer [Figure 5C shows thickness of dielectric layer (524B) is greater at periphery portion (where conductive materials are located) compared to thickness at center of chuck (524E)], varying DC bias can be produced over the wafer to compensate for the non-uniform processing characteristics of wafer (column 6, line 20 to column 8, line 60). Hao also teaches that dielectric layer may be formed in any shape in accordance with the uniformity characteristics.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control (optimize) thickness of dielectric layer as per desired uniformity

characteristics as taught by Hao in the apparatus of **Ogahara in view of Sills et al and Shamouillian et al** to achieve desired processing uniformity characteristics.

Regarding Claim 13: Ogahara teaches that substrate holding plate (insulating layer) is formed of alumina (Column 2, lines 37-43).

Regarding Claim 15: Shamouilian et al teach (Figure 1c) that insulating layer 35 is disposed under first electrode (said first conductive material) 135 and second electrode (said second conductive material) 130 and between said first conductive material 130 and base (said electrode) 25 and between said second conductive material 135 and base (electrode) 25 {Column 8, lines 1-30}. Further, Hao teaches that another portion of dielectric (insulating layer) 524E is formed at the central part of electrode 526 (Hao - Fig 5C).

Regarding Claim 16: Ogahara in view of Sill et al teach all limitations of the claim including a direct current power source 64 connected between electrode 1 and high frequency power source 63 (Ogahara – Figure 1 and Column 8, lines 35-45).

Regarding Claims 18, 19: Hao teaches that geometry (thickness) of insulating layer in the various zones of the electrostatic chuck is configured (optimized) to compensate for the non-uniformity processing characteristics of the wafer (column 6, line 12 column 8, line 60).

In this regards courts have ruled (Case law):

"It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980)."

"It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable through routine experimentation in the absence of a showing of criticality. *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990)."

"Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. It would have been obvious to one having ordinary skill in the art to have determined the optimum values of the relevant process parameters through routine experimentation in the absence of a showing of criticality. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)."

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogahara (US Patent No. 5,958,265) in view of Sill et al (US Patent No. 6,367,413), Shamouillian et al (US Patent No. 6,557,248) and Hao (US Patent No. 6,188,564) as applied to Claim 16 and further in view of Nakano et al (US Patent No. 6,270,618).

Regarding Claim 17: Ogahara in view of Sill et al, Shamouillian et al and Hao teach all limitations of the claim including RF filter 64, 66 (could be configured as resonant circuits including resonant coils) connected between DC power source 50 and electrodes 46, 44 (Sill et al – Figure 1, lines.

Ogahara in view of Sill et al, Shamouillian et al and Hao do not teach resonant coil connected between feeder line and electrode.

Nakano et al teach an apparatus (Figures 1A, 3) that includes band eliminators (resonance LC circuit) 61b, 61b' where resonance coils L2, L2' are connected between electrode 8 and feeder line [Column 2, lines 40-50 and Column 3, lines 30-65].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a resonant circuit (coil and capacitor) as taught by Nakano et al in the apparatus of Ogahara in view of Sill et al, Shamouillian et al and Hao to provide

resonant coil (band eliminators) to enable trap plasma between plasma excitation electrode and susceptor electrode (Column 3, lines 30-54).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rakesh Dhingra

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763